

## **TABLE OF CONTENTS**

7.0	UPDATE OF SITE-SPECIFIC DECOMMISSIONING COSTS .....	7-1
7.1	Introduction.....	7-1
7.1.1	History .....	7-1
7.2	Decommissioning Cost Estimate .....	7-3
7.2.1	Cost Estimate Description & Methodology .....	7-3
7.2.2	Summary of the Site Specific Decommissioning Cost Estimate .....	7-4
7.3	Decommissioning Funding Plan .....	7-6
7.4	References.....	7-9

## **TABLES**

7-1	Summary of Remaining Decommissioning Costs in Year 2005 Dollars.....	7-6
-----	--	-----

## **FIGURES**

7-1	Summary of Remaining Decommissioning Costs in Year 2005 Dollars.....	7-8
-----	--	-----

This page intentionally left blank

## **7.0 UPDATE OF SITE-SPECIFIC DECOMMISSIONING COSTS**

### **7.1 Introduction**

In accordance with 10 CFR 50.82(a)(9)(ii)(F) [Reference 0] and Regulatory Guide 1.179, “Standard Format and Content of License Termination Plans for Nuclear Power Reactors,” [Reference 0] the site-specific cost estimate and funding plans are provided. Regulatory Guide 1.179 provides guidance with respect to the information to be presented.

The License Termination Plan (LTP) must:

Provide an estimate of the remaining decommissioning costs, and compare the estimated costs with the present funds set aside for decommissioning. The financial assurance instrument required per 10 CFR 50.75 must be funded to the amount of the cost estimate. If there is a deficit in present funding, the LTP must indicate the means for ensuring adequate funds to complete the decommissioning.

The decommissioning cost estimate includes an evaluation of the following cost elements:

- Cost assumptions used, including a contingency factor,
- Major decommissioning activities and tasks,
- Unit cost factors,
- Estimated costs of decontamination and removal of equipment and structures,
- Estimated costs of waste disposal, including applicable disposal site surcharges and transportation costs,
- Estimated final survey costs, and
- Estimated total costs.

The cost estimate should focus on the remaining work, detailed activity by activity. The cost estimates should be based on credible engineering assumptions that are related to all major remaining decommissioning activities and tasks. The cost estimate should include the cost of the remediation action being evaluated, the cost of transportation and disposal of the waste generated by the action, and other costs that are appropriate for the specific case.

Sacramento Municipal Utility District (the District) owns a 100% undivided interest in Rancho Seco Nuclear Generating Station (Rancho Seco) and provides financial assurance for decommissioning through the use of an external sinking fund.

#### **7.1.1 History**

After plant shutdown in 1989, Decommissioning Cost Estimates were performed. Beginning in 1995, TLG Services, Inc. (TLG) provided the District with alternative cost estimates that included options for the decommissioning of the facility. Delays in the Fuel Dry Storage project caused large increases in projected costs, and the alternatives were provided to take advantage of the available opportunities, including: availability of District Staff on site to

support dismantlement due to delays in the Fuel Dry Storage project, and; availability of *EnergySolutions*<sup>1</sup> as an appealing option for low-level radioactive waste disposal.

In January of 1997, the District Board of Directors (the Board) approved the Incremental Decommissioning Project, and dismantlement of the facility began in earnest. In 1999, the Board approved expansion of the Incremental project to include all activities necessary for license termination. Currently, the available options for disposition of Class B and Class C low level radioactive waste are not considered to be suitable by the District. Therefore, this waste will be stored onsite until a suitable option becomes available. In addition, the greater than Class C (GTCC) waste will be stored at the Independent Spent Fuel Storage Installation (ISFSI) until the Department of Energy (DOE) develops a suitable disposal site to accept that waste. The Cost Estimate includes the disposal costs for the Class B, Class C, and GTCC wastes. The basis for the current estimate includes completion of all dismantlement work by 2008, with disposition of the stored radioactive waste by 2028.

After the cessation of plant operations, the initial decommissioning alternative chosen was a modified SAFSTOR option identified as Hardened SAFSTOR. The facility was to be placed into a safe, stable condition including transferring the used nuclear fuel from wet to dry storage. Because of the premature shutdown, the Decommissioning Trust Fund was not adequately funded to carry out decommissioning. The District proposed a plan, which the Nuclear Regulatory Commission (NRC) approved, to continue annual contributions to the Decommissioning Trust Fund over the time period of the original operating license, extending through 2008, at which time the Trust would be fully funded. This allowed collection of funds while minimizing the overall financial impact to District operations. Dismantlement activities were to commence once the funding was complete.

In the original basis for the cost estimate, after Hardened SAFSTOR was achieved, a staffing reduction was planned to correspond with the reduced need to maintain plant systems and facilities. Delays in the fuel project resulted in maintaining site staff at a higher level longer than originally planned resulting in overall increases in decommissioning costs. While the delays resulted in increased annual contributions to the trust fund, they also resulted in maintaining a large talent pool on site with considerable process knowledge of operating history and radiological conditions within the facility.

The availability of *EnergySolutions* combined with the presence of a large talent pool within the available staff presented an opportunity to begin the dismantlement process early. In 1996, a plan was developed to take advantage of both circumstances and perform dismantlement of the majority of the secondary systems in the Turbine Building. This was proposed to the Board as the Incremental Decommissioning Project, which they subsequently approved as a 3-year project in January 1997.

The Incremental Decommissioning Project was successful in helping to mitigate the impacts of the delay in the fuel project, and the work was completed ahead of schedule and below projected costs. The Incremental project was so successful that the scope was expanded to include systems in the Tank Farm and other outside areas.

During the time period of Incremental Decommissioning, additional circumstances outside of the District's control resulted in further delays in the fuel project and additional impacts to the cost estimate and the Annual Trust Fund contribution. Based upon the success of the

---

<sup>1</sup> *EnergySolutions* was previously Envirocare of Utah

Incremental project and the need to mitigate additional increases to future Annual Trust Fund contributions, District staff put together a plan for continuing decommissioning through license termination, with the goal to complete decommissioning in 2008. The Board approved this plan in July 1999, and the District shifted from Incremental Decommissioning to Decommissioning.

## **7.2 Decommissioning Cost Estimate**

### **7.2.1 Cost Estimate Description & Methodology**

The decommissioning cost estimate is prepared to satisfy the requirements of Title 10 of the Code of Federal Regulations, Part 50.75. The origin of this cost estimate is the Area-Based Decommissioning Cost Estimate prepared in 1999 and later updated in the year 2000 by TLG. Subsequently, District staff updated the estimate in the year 2001, 2002, 2003, 2004 and again in the year 2005 [Reference 7-3]. Each of these updates prepared by District staff was reviewed by TLG and, as such, is utilizing the current 2005 estimate updated with actual cost and forecast data as the basis for the cost estimate in this submittal of the LTP.

The methodology used to develop the cost estimate follows the basic approach originally presented in the Atomic Industrial Forum (now Nuclear Energy Institute) program for developing standardized decommissioning cost estimates published as AIF/NESP-036, "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," [Reference 7-4]. This document presents a unit cost factor method for estimating direct activity costs, activity by activity, simplifying the estimating process. Unit factors for the removal of equipment, concrete, steel, etc., were constructed from site-specific labor costs provided by the District. The unit factors are based upon labor costs currently being used as part of the incremental decommissioning project. The direct activity costs were then estimated using the plant inventory developed for each work area.

The unit cost factor method provides a demonstrable basis for establishing reliable cost estimates. The detail available in the unit cost factors for activity time, labor costs (by craft), and equipment and consumable costs provides assurance that cost elements have not been omitted. The detailed unit cost factor, coupled with the plant-specific inventory of piping, components, and structures, provide a high degree of confidence in the reliability of the cost estimate.

To account for the unique working conditions associated with decommissioning, work difficulty factors (WDFs) were assigned to each work area. WDFs are commensurate with the inefficiencies associated with working in confined, hazardous environments and are applied as increases to the unit cost factors. The WDFs take into account factors associated with access difficulties, use of respiratory protection, Radiation Protection/ALARA, use of protective clothing and accounting for work breaks. These factors and their associated range of values were developed in conjunction with the Atomic Industrial Forum's Guidelines Study.

The decommissioning plan schedule was used to determine the period-dependent costs for program management, administration, field engineering, equipment rental, contracted services, etc. The study relies upon site-specific salary and wage rates for the personnel associated with the intended program.

TLG's cost model is comprised of a multitude of distinct cost line items, calculated using cost factor methodology described earlier. Period-dependent and collateral costs are combined to produce a comprehensive accounting of the identified expenditures. However, the resulting

costs in and of themselves do not comprise the total cost to accomplish the project goal of license termination.

Consistent with industry practice, contingencies were applied to the decontamination and dismantlement costs developed as specific provision for unforeseeable elements of cost within the defined project scope, particularly important where previous experience has shown that unforeseeable events that will increase costs are likely to occur. The cost elements in the estimate are based on ideal conditions; therefore, the types of unforeseeable events that are almost certain to occur in decommissioning, based on industry experience, are addressed through a percentage contingency applied on a line item basis. The contingency, as used in the estimate, does not account for price escalation and inflation in the cost of decommissioning over the remaining project duration.

### **7.2.2 Summary of the Site Specific Decommissioning Cost Estimate**

The decommissioning cost estimate in total is defined as the funding required to complete decommissioning, however, the cost assigned to a given line item within the estimate is not as rigorously defended. A basic assumption of the estimating process is that when specific line items have been over-estimated, the unspent funds will be required to cover the costs associated with other line items that have been under-estimated. Historically, the overall impact is that the cost of work completed to date has been, in general, over-estimated. This has resulted in funds that were not required to offset the actual costs incurred in completing work. However, the presupposition of the correctness of the total estimated cost requires that these funds be preserved for future work. The remaining cost projected to complete the decommissioning of Rancho Seco is \$138.3<sup>2</sup> million for the period 2006 through Phase I site release in 2008, with additional amounts of \$24.7 million for the transfer of GTCC waste to the DOE in 2027, oversight of waste stored in the Interim Onsite Storage Building (IOSB) through 2028, and Phase II license termination in 2028. The total cost for decommissioning, including previously expended funds, is \$534 million (to-date actual costs in the year spent dollars plus future work in year 2005 dollars). A summary of the remaining major cost contributors is provided in Table 7-1 and graphically in Figure 7-1.

The cost estimate provides an overall cost for the duration of the project including all costs incurred after transitioning from operating and maintenance (O&M)-financed expenses after plant shutdown through 10 CFR 50 license termination, plus an amount to cover District costs anticipated for transferring control of the used nuclear fuel to the DOE. The costs contained in this cost estimate can be generally grouped into four basic categories. These are: technical decommissioning costs; non-technical District costs; the staffing plan; and fuel dry storage project costs.

The section of the cost estimate based upon detailed engineering calculations is the technical portion of the decommissioning cost estimate. This portion is based upon engineering calculations that use a variety of input factors, which include the following:

- Unit cost factors for removal;
- Inventories of plant systems and components remaining after the Incremental Decommissioning project;

---

<sup>2</sup> From the current Cost Estimate, Reference 7-3

- Difficulty factors involving the level of effort required and the ability to physically access the material;
- Impacts due to radiological conditions (both radiation and contamination); and
- The presence of hazardous materials (e.g., lead-based coatings, asbestos insulation).

The technical costs include the direct costs of dismantlement and the indirect costs including generation of incidental radioactive waste, required health physics supplies, small tool allowances, and other costs in the “Undistributed” category. The basis for the technical decommissioning costs remains the 2000 Cost Estimate Update prepared by TLG, except when specific costs are updated based upon additional data such as recent industry or site experience.

The Area Based Decommissioning Cost Estimate prepared by TLG Services in 1999 and subsequently updated in 2000 is the basis for the LTP cost estimate for Rancho Seco. The estimated total cost is \$534 million which is the sum of previously expended funds in the dollars for the year spent, plus future costs in 2005 dollars. For budgetary and financial planning purposes, this estimate has escalated annually for inflation at a average rate of 2.7% for general costs and 3% for staffing costs.

Technical costs are now updated using the basic methodology described above. The basis for the technical costs remains that used for the 1999 Area-Based Cost Estimate with long-term contract information as provided in the 2000 update. Both the 1999 Estimate and 2000 Update were performed by TLG.

In certain instances, line item values have been changed to reflect an increased level of detail in work planning. The changes are made by redistributing available funds among a larger number of detailed line items, however, the total costs remain consistent with previous estimates and the update methodology described. In these cases, the changes reflect the increased level of detail in the scheduling software and maintain consistency between the scheduling software and the cost estimate.

Non-technical District costs are those associated with facility maintenance, District overhead, travel to professional seminars, and other costs not directly derived from the decommissioning process. These costs are determined through the annual budgeting process, and are forecast through the end of the project based upon historical data. The schedule of the technical portion of the project provides the basis for determining the non-technical costs.

A major contributor to the overall cost of decommissioning is the staff cost. The cost of staff is based upon the staffing plan developed to meet the decommissioning schedule and needs of the project in terms of staffing levels, and also based upon the actual and projected staffing costs derived from current contracts and the budgeting process. Also included are additional staff costs required to oversee the radioactive waste stored in the IOSB until shipped for disposal.

Fuel dry storage project costs include fuel storage costs through 2008 and the cost of transferring the GTCC material, which will be stored until transfer with the fuel in the ISFSI, to the DOE. The transfer of the GTCC material is tied to the fuel storage because it is assumed the GTCC material would be placed into the same repository as the fuel when the DOE develops the repository.

Consistent with the NRC definition of decommissioning under 10 CFR 50.2, the radiological decommissioning costs consider those costs that are associated with normal decommissioning

activities necessary for termination of the Part 50 license and release of the site for unrestricted use. Additionally, the Cost Estimate includes costs for fuel storage through 2008, coinciding with the scheduled completion of phase one of License Termination. The Cost Estimate does not include costs associated with the disposal of non-radiological materials or structures beyond that necessary to terminate the Part 50 license.

**Table 7-1**  
**Summary of Remaining Decommissioning Costs**  
**In Year 2005 Dollars (thousands of dollars)**

<b>Work Category</b>	<b>Cost in 2005\$ (2006 &amp; beyond)</b>	<b>Remaining Costs</b>
Decontamination	2,663	1.6%
Large Components, RB Concrete	28,429	17.4%
Transportation	2,768	1.7%
Waste Disposal	7,126	4.4%
Characterization/Remediation	14,961	9.2%
Final Status Survey	13,434	8.2%
Project Staffing	52,730	32.3%
Materials and Equipment	3,278	2.0%
Insurance	1,156	0.7%
Other Undistributed Costs	12,811	7.9%
Contract & Material Surcharges	823	0.5%
Stored Waste Oversight	1,994	1.2%
Class B, C, & GTCC Disposal Costs	20,552	12.6%
Total	163,088	100.0%
Expended thru 2005	371,097	
Grand Total	534,185	

### **7.3 Decommissioning Funding Plan**

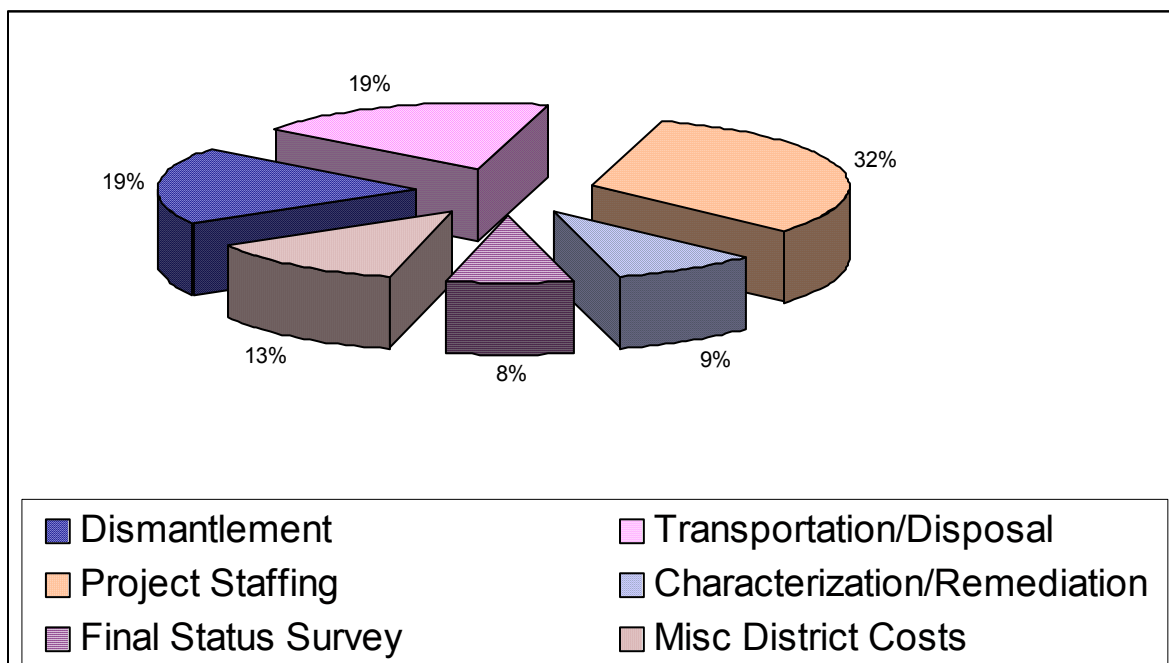
The District had maintained an internal decommissioning fund since the early 1980's. In 1991, the District transferred \$90 million from the internal fund into an "external sinking decommissioning trust fund" and submitted its Financial Assurance Plan to the NRC describing the use of the external sinking fund. There have been no significant modifications to the external sinking fund since the initial submittal.

The District plans to accumulate funds in the external trust fund, at the rate of \$27 million per year, through 2008. Based on the current decommissioning cost estimate and funding rate, collecting funds through 2008 will provide sufficient funds to complete decommissioning Rancho Seco and terminate the 10 CFR Part 50 license.

The external trust fund is currently maintained by Wells Fargo Bank. The balance is reviewed on an annual basis to ensure the adequacy of the annual contribution to assure funds will be available to complete decommissioning and terminate the 10CFR Part 50 license.



The District has concluded that the current estimate forecast is adequate to complete the remaining decommissioning activities for Rancho Seco. Actual costs are monitored continuously against estimated costs. The Cost Estimate is updated annually per 10 CFR 50.75(b)(2) and reflects impacts such as industry experience and items identified by the monitoring process.



**Figure 7-1**  
**Summary of Remaining Decommissioning Costs in Year 2005 Dollars**

**7.4      References**

- 7-1      U.S. Code of Federal Regulations, Title 10, Part 50--Domestic Licensing of Production and Utilization Facilities, Section 82—Termination of License
- 7-2      U.S. Nuclear Regulatory Commission, Regulatory Guide 1.179, “Standard Format and Content of License Termination Plans for Nuclear Power Reactors,” January 1999
- 7-3      TLG Services, Inc., “2005 Decommissioning Cost Estimate for the Rancho Seco Nuclear Generating Station,” December 31, 2005, Rev. 1
- 7-4      AIF/NESP-036, “Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates,” May, 1986

This page intentionally left blank